

In conclusion, I<sup>2</sup> would like to emphasize the following points:

1. The importance of bearing in mind the liability of appendicitis to follow acute tonsillitis.

2. That the appendicular involvement may be only part of a generalized infection, hence the gravity of such cases out of proportion to the local symptoms.

3. The tendency for such cases to be atypical in their clinical course, and after smouldering, to suddenly develop fulminating symptoms.

4. Chronic tonsillar infections should be kept in view as the possible cause of similar infections of the appendix.

5. That whereas at least some degree of local tenderness and rigidity are almost always to be elicited on careful examination of the abdomen in the right iliac region in acute appendicitis, in rare cases these signs may be absent.

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### LIGATION OF THE PORTAL VEIN IN SUPPURATIVE PORTAL PHLEBITIS.

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THE problem of attacking pylephlebitis along the lines employed in septicemia of otitic and of uterine origin, has as yet attracted no great attention.<sup>1</sup> A. G. Gerster,<sup>2</sup> commenting on this disease, says: "The evacuation of septic thrombi from the jugular vein in mastoid disease has yielded such excellent results that the application of the principle to the portal vein would be natural and logical. But the anatomical relations, while very favorable in the former instance, are just the reverse in the latter. Only a short piece of the portal vein, that situated in the hepatoduodenal ligament, is approachable. The two mesenteric veins and the splenic are practically inaccessible. Hence, though phlebotomy of the portal trunk in the hepatoduodenal ligament is not impossible, the evacuation of thrombi by flushing through a catheter seems to be too problematic, not to mention the technical difficulties the surgeon might encounter in the closure of the phlebotomy wound."

<sup>2</sup> Read before the Canadian Medical Association, St. Johns, July, 1914.

<sup>1</sup> H. Kehr, *Chirurgie d. Gallenwege*, 1913. Suppurative thrombi in the portal vein have never been removed operatively. Such a procedure might possibly have a beneficial effect.

<sup>2</sup> *Trans. Am. Surg. Assoc.*, 1903.

More recently, H. Neuhoﬀ,<sup>3</sup> in his work on the experimental ligation of the portal vein, has called attention to the following important facts: "Although the portal vein has been more or less completely ligated for accidental injury in a very few instances (possibly two cases), a deliberately planned ligation has never been practised." Further, "The fact that no surgery of the portal vein has as yet developed, appears to depend upon the results of animal experimental studies. Many observers have demonstrated that ligation of the portal vein regularly leads to death in a very short time—in half an hour to two hours."

On the other hand, by experimental work Neuhoﬀ has established that gradual occlusion of the portal vein is not fatal. The cases of Brewer and Burdenko<sup>4</sup> indicate that in human beings a gradual occlusion due to pressure, followed by a ligation, is compatible with life, provided collateral circulation has been established. In view of these facts, Neuhoﬀ advocated ligation of the portal vein in suppurative pylephlebitis, realizing that the portal thrombus by gradually occluding the portal vein might have induced the development of a collateral circulation prior to the ligation of the vein, and that such a ligation would prevent further bacteria being swept from the radicles of the superior mesenteric vein into the liver. In animal experiments, moreover (Burdenko), it has been shown that the portal vein may be ligated successfully, provided there are preformed anastomoses produced by operative adhesions between the parietes and the omentum and intestines.

Guided by such considerations, and having realized some years ago that an interference at a lower level (*e. g.*, ileocolic vein) would have no effect, the following case was operated upon. The plan of procedure, as soon as the diagnosis was made, was as follows: To insure an adequate collateral circulation, I wished to make, if possible, a venous lateral anastomosis between the left spermatic vein a few inches below its confluence with the left renal vein and one of the larger branches of the inferior mesenteric vein.<sup>5</sup> In this way, the portal and systemic circulations would be satisfactorily anastomosed. In addition, I proposed to perform an omentopexy to establish other anastomotic paths. At the second operation, I planned to ligate the portal vein, to cut the vein above the ligature and drain the hepatic end with rubber tube run into the lumen of the stump and at the same time perform a cholecystostomy to drain the biliary system.

All that I planned to do I was not able to carry out, as will be seen from a perusal of the case report. Owing to the interest of such a case the data will be given in some detail:

<sup>3</sup> Surg., Gyn. and Obst., 1913.

<sup>4</sup> Deutsch. Ztschr. f. Chir., 1913, cxxiv.

<sup>5</sup> The application of this idea to the treatment of cirrhosis might prove of value.

**CASE REPORT.**—H. G., aged twenty-five years; shipping clerk; married. Admitted February 20, 1915. Died March 1, 1915.

**Diagnosis.** Acute gangrenous appendicitis. Operation: Appendicectomy.

**Postoperative Complications.** Pylephlebitis. Secondary Operations: Omentopexy, ligation of portal vein. Cholecystostomy.

**Family History.** Father and mother dead; five brothers all well; two sisters also well. No tuberculosis or cancer in family.

**Past History.** Patient smokes ten cigarettes a day. Drinks occasionally. Had gonorrhea three years ago. Denies syphilis, pneumonia, scarlet fever, typhoid, etc. Two weeks ago had grippe and sore throat.

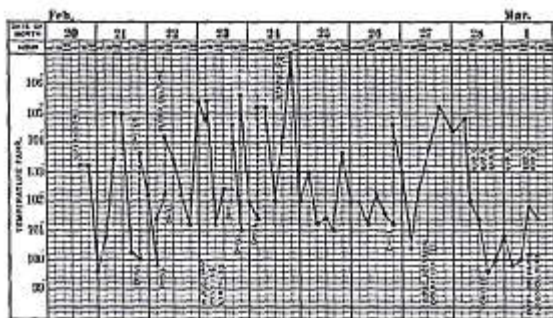


FIG. 1.—Temperature chart.

**Present History.** Wednesday, February 17, 1915; in the morning the patient experienced general abdominal cramps, associated with vomiting, constipation, chills, and fever. The general pains subsided and became localized in the right iliac region. Patient has been thirsty and has had frequency of urination. Since the day of onset, also very much prostrated, not having had any sleep on account of the pains. Has no cardiorespiratory or renal complaints.

**Synopsis.** Pain in right iliac region since Wednesday.

**PHYSICAL EXAMINATION.** *General Condition.* Good. Patient is well nourished.

*Head.* Eyes react to light and accommodation. No palsies; no petechiae. Tongue coated. Teeth in good condition. Pharynx congested. Tonsils negative. Ears and mastoid and thyroid negative.

*Glands.* Negative. *Chest.* Expansion fair and equal. Lungs, anterior and posterior negative; no dulness, no rales. Heart, U. B., third rib; R. B., right border of sternum; L. B., fifth space mid-clavicular line; sounds booming at apex, slight roughness of the first sound; sounds negative at base.

*Pulses.* Equal, regular, and of good force; tension not increased but rapid.

*Abdomen.* Symmetrical; tympanitic; tenderness, rigidity, and spasm of right rectus muscle in the iliac region; rebound sign positive. Spleen, kidney, and liver not palpable.

*Rectum.* Tenderness and sense of resistance in the right iliac fossa.

*Extremities.* Negative.

*Synopsis.* Tenderness, rigidity, and spasm of right rectus muscle in right iliac region.

**OPERATIVE PROCEDURES.** *First Operation.* February 20, 1915. (Dr. Shlimbaum, house surgeon) G. and E. Appendicectomy for acute gangrenous appendicitis. Incision two and a half inches, right rectus muscle splitting.

*Findings.* Appendix found to be entirely gangrenous with fibrinous exudate on tip. No evidence of thrombosis in mesenteriolum.

*Procedure.* Amputated in usual fashion: stump carbolyzed, closure of abdominal wound in layers.

*Specimen.* Last inch of appendix somewhat bulbous, gangrenous and contains foul-smelling pus.

February 21. Looks very septic; two chills. Temperature, 99.8° to 105°; pulse, 106 to 132. Blood culture taken today showed streptococci. Has severe right-sided abdominal pains. Jaundice present.

February 23. Leukocytes, 18,000; polynuclears, 94 per cent.; lymphocytes, 6 per cent.

February 23. Since operation the patient had chills daily and septic temperature. Conjunctivæ deeply icteric. Complaints of pain in right hypochondrium, where there is distinct tenderness over liver, which is distinctly enlarged. Wound clean.

February 24. Jaundice more marked today. Chills and high temperature persist. Tenderness over liver more marked. *Diagnosis:* Suppurative portal phlebitis.

*Second Operation,* February 24. (Dr. Beer, G. and E.) Patient taken to operating-room with idea of anastomosing inferior mesenteric vein and spermatic (left), and doing an omentopexy so as to establish collateral circulation preliminary to ligation of portal vein for pyelophlebitis.

Incision along the crest of the ilium to left of left rectus muscle. Lower pole of kidney and ureter exposed. Spermatic vein isolated. Vein branch of inferior mesenteric isolated. Attempt at making anastomosis was unsuccessful, owing to very small caliber and thin

wall of inferior mesenteric branch. Peritoneum was then opened to make an omentopexy and portal fissure palpated. Fair-sized indurated area and enlarged glands palpable at portal fissure. Omentum brought down and sutured to parietal peritoneum with plain catgut suture. Peritoneum then repaired as usual. Wound closed in layers.

NOTE. No ascites. Vessels in omentum and branches of inferior mesenteric vein showed little abnormal congestion.



FIG. 2.—Sketch of ligated portal vein and branches with suppurating adherent thrombus proximal to ligature.

February 24 to 27. Patient seemed to remain about same. Temperature was lower and only one chill.

*Third Operation.* February 27. Ligation of the portal vein for suppurative phlebitis; cholecystostomy for drainage of the bile tract (Dr. Beer).

Incision four to five inches right rectus from ribs to level of umbilicus. Small amount of bile-stained fluid in the peritoneal cavity. Marked venous congestion of the stomach and gastro-

hepatic ligament. As the foramen of Winslow was shut off, and as the distended gall-bladder prevented an easy approach to the region of the portal vein from the right side, the peritoneum over the vein was opened just above the duodenum over what appeared to be the site of the portal vein. Numerous glands of deep red color blocked the approach, and dissection along the tract of the hepatic artery caused very disagreeable bleeding. The bleeding was controlled and a cholecystostomy performed. Then another attempt was made to reach the vein after exposing the choledochus for two inches. This approach was not blocked by glands and exudate, and the large blue vein was found mesial to the duct on a slightly deeper plane. It was impossible to state that there was a thrombus within, though the walls seemed thicker than normal. A ligature was thrown about the vein and, on pulling it sufficiently tight to occlude the lumen, no change in the patient's pulse was detected (Dr. Wilensky). Thereupon the vein was tied with heavy catgut. Rubber dam to ligature coming out along the gall-bladder tube. Wound closed and dressed.

Patient was much shocked and in poor condition when returned to ward at 5 P.M. Under heroic stimulation his condition improved.

February 27, 8.15 P.M. Condition fair. Pulse of fair tension, regular, and of rate of 140. Respiration regular and not rapid (34).

8.45 P.M. Condition unchanged. Tongue very dry, rough and brownish; fur on dorsum.

9.15 P.M. Salt solution not retained by bowel. Answers questions correctly.

9.45 P.M. Condition unchanged. Looks comfortable. Pulse and respiration unchanged. Mind perfectly clear.

10.45 P.M. Pulse 140. Good quality. Beats practically same in force, but occasionally one of weaker quality is felt. Was sleeping. Now awake. Recognizes surroundings and persons previously known to him. Jaundice apparently (artificial light) somewhat less marked. Tongue very dry in centre. Is taking fluids in two to three dram quantities without vomiting. Bile drainage, four ounces.

11.20 P.M. General condition pretty fair. Pulse 134, good quality, regular in rate and rhythm. Does not complain of any pain. Jaundice seems decidedly diminished, particularly of conjunctivæ. Breathing is regular, slightly increased in rate.

February 28 and March 1. Enemata effectual and flatus expelled. Edema of scrotum and lower abdominal wall (perhaps more on left side) present this morning; also of penis and suprapubic region. (Infection?) Retention of forty ounces of urine relieved by catheter.

Lumbar wound infected, fascial necrosis present. Sutures removed, wound opened widely and packed with iodoform gauze. Bile drainage six ounces.

Blood culture taken in morning showed *Bacillus coli*. In the afternoon patient became gradually comatose, and died forty-eight hours after operation without having given any evidence of blood either in vomitus or in stool.

*Urine Report.* February 21. Amber; acid; sp. gr., 1028; albumin, heavy trace; sugar and bile negative. Microscopically: hyaline casts, epithelial cells, and a few leukocytes.

February 22. Bile, negative.

February 24. Bile in urine.

February 25. Bile in urine.

February 28. Bile in urine.

*Blood Report.* February 25. Blood culture of 12 c.c., streptococcus.

March 3. Blood culture; *Bacillus coli*.

**DIAGNOSIS.** Acute suppurative pylephlebitis (secondary to acute gangrenous appendicitis). Ligation of portal vein. Streptococemia.

**INCOMPLETE AUTOPSY** (by Dr. Baehr). *General.* Marked icterus, no petechiae. Rigor mortis marked.

*Abdomen.* The abdominal viscera inspected through surgical incision along the right rectus muscle. No ascites. The portal vein found tied off with catgut about 1.5 cm. above the head of the pancreas. Distal from the ligation, the entire portal system was found to be filled with thick dark brown grumous purulent material consisting of pus mixed with some blood. In the portal vein near the bifurcation and in its left main branch, there were also flat purulent thrombi on the vessel wall. Proximal to the ligation, the splenic and inferior mesenteric vessels were found to be patent. The superior mesenteric and its right colic branch were found to be filled with yellowish white purulent material. In places there were also thrombi. The thrombosed vessels containing yellowish white pus led down to the region of the cecum and ileo-cecal junction. The vessels in the immediate neighborhood of the appendix site were empty and showed no suppurative process.

*Gastro-intestinal Tract.* Appears normal, showing no circulatory disturbance. The coronary veins along the upper half of the lesser curvature are widely dilated. The appendix stump appeared to be normal.

Retroperitoneal veins behind the ascending colon show a similar dilatation.

*Liver.* Slightly larger than normal. Its lower border reaches down about one finger breadth below the free border of the ribs. On section the organ is seen to be studded with areas in which there are numerous small yellowish foci consisting of collections of pus. In the immediate neighborhood of each of these areas is also a radicle of the portal vein, filled with dark grayish brown purulent material. The intervening liver parenchyma shows merely cloudy

swelling. The common bile duct is patent and contains some thin yellowish bile.

*Gall-bladder.* Fastened to the abdominal wall by a catgut suture. A hole in its fundus is also closed with a suture. The organ itself contains a small amount of mucopurulent material which is slightly bile stained.

*Spleen.* About one-half larger than normally. No organs removed.

*Bacterial Report.* *Bacillus coli* from pus from liver.

**MICROSCOPIC EXAMINATION.** *Liver.* Capsule of normal thickness. There is moderate passive congestion in the centres of the lobules. The liver cells in this region are somewhat smaller than normal and contain granules of brownish pigment. In Glisson's capsule throughout the organ there are numerous and extensive round cell infiltrations. These have no relation to the bile ducts and the hepatic arteries. In some places, there are large collections of pus cells and cellular detritus, in the midst of which masses of bacteria are frequently to be seen. Most of these abscesses appear to extend from foci in Glisson's capsule. Many of the smaller radicles of the portal vein contain parietal blood-platelet thrombi. Their lumen usually contains red blood cells and only rarely collections of pus cells. The larger radicles of the portal vein appear to be for the most part completely destroyed by a suppurative process and in some places the abscesses can be seen to be extending from this by contiguity.

*Spleen.* Capsule and trabeculae of normal thickness. Sinuses in the pulp and the large venous sinuses are markedly dilated. Malpighian bodies rather small, contain no germinal centres and are surrounded by a zone of congestion.

The most striking feature of this case of fulminating portal vein suppuration is to be found in the absence of all signs and symptoms of obstruction to the return flow of the portal blood despite ligation of the portal vein. How this is to be explained I admit I do not know. Whether it was accidental, and due to some anomaly in our patient's circulation, or whether the short duration of the incomplete portal obstruction had forced collateral circulation to such an extent, it is impossible to say at this time. That complete ligation of the portal vein did not lead to some engorgement of the viscera surprised me very much, as I do not believe that the omentopexy gave much assistance to the return flow. Unfortunately the patient's condition became so bad during the third operation that I was not able to do what I had planned, *i. e.*, cut across the portal vein above the ligature and drain the hepatic end with a tied-in tube. Knowing the remarkable power that the liver has shown in fighting infection, I believe that this assistance would be of great value. Further experience along these lines will demonstrate whether one can expect to save these cases in the manner outlined in this paper.